

86446

Galvanomagnetic Properties of Tellurium. II. S/181/60/002/011/034/042  
The Effect of Heat Treatment Upon the B006/B060  
Temperature Course of Mobility

and upon the mobility defined by  $u_H = 1.6 \cdot 10^8 \sqrt{\frac{\Delta \varphi}{H^2}} \text{ cm}^2/\text{v.cm}$ , as recorded on the purest specimens (monocrystals). As a consequence of the heat treatment, mobility rises sharply, the temperature dependence of mobility changes considerably, while the Hall mobility and  $u_{\Delta \varphi}$  attain values approaching closely. The carrier concentration grows from  $4.9 \cdot 10^{14}$  to  $2.4 \cdot 10^{15} \text{ cm}^{-3}$ . Fig. 4 illustrates the temperature dependence of the Hall mobility and the reduced chemical potential  $\mu^* = \mu/kT$  for different specimens (having different carrier concentrations). The higher the concentration, the less marked will be the mobility maximum and the lower will be the curve. The Hall mobility of the specimen with  $4.6 \cdot 10^{18} \text{ cm}^{-3}$  has a course without maximum and drops with rising temperature. The temperature courses of ohmic mobility  $u_0 = 1/en\eta$  were recorded prior to and after the heat treatment on the purest specimens (No.2) and analyzed. It is inferred from the results that the effect of heat treatment upon the galvanomagnetic properties will be the greater, the smaller the carrier concentration, i.e., the purer the specimen. A. M. Pogarskiy is thanked

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86446

Galvanomagnetic Properties of Tellurium. II. S/181/60/002/011/034/042  
The Effect of Heat Treatment Upon the B006/B060  
Temperature Course of Mobility

for assistance in preparing the specimens. There are 6 figures and  
3 references: 1 Soviet, 1 Japanese, 1 US, and 1 British.

ASSOCIATION: Institut poluprovodnikov AN SSSR Leningrad (Institute of  
Semiconductors of the AS USSR, Leningrad)

SUBMITTED: July 21, 1960

Card 3/3

GUREVICH, V. L.; PARFENYEV, R. V.; FIRSOV, Yu. A.; SHALYT, S. S.

"The investigation of a new type oscillations in the magneto-resistance"[sic]

report submitted for Intl Conf on Physics of Semiconductors, Paris, 19-24  
Jul 64.

IPARFEN'YEV, R.Y.; PARBSHEV, I.I.; SHALYT, S.S.

Galvanomagnetic properties of tellurium. Part 2: Effect of  
annealing on the temperature-mobility relationship. Fiz. tver.  
tela 2 no.11:2923-2928 N '60. (MIRA 13:12)

1. Institut poluprovodnikov AN SSSR, Leningrad.  
(Tellurium--Electric properties)

PARFEN'YEV, R.V.; CHUDNOVSKIY, F.A.

Using semiconductor thermistors as transmitters for automatic and simultaneous measurements of temperature, air moisture, and effective radiation [with summary in English]. Inzh.-fiz. zhur. no.4:87-92 Apr '59. (MIRA 12:5)

1. Agrofizicheskiy institut, g. Leningrad.  
(Thermistors) (Electric measurements)

L 34709-65 EWT(1)/EWT(m)/EEC(t)/EWT(b)/EWP(t) Feb IJP(c) JD  
 S/0056/64/047/005/1683/1686  
 ACCESSION NR: AP5000314  
 AUTHORS: Shaly't, S. S.; Parfen'yev, E. V.; Aleksandrova, M. V.  
 TITLE: Concerning a new type of oscillation of longitudinal mag-  
 netoresistance of n-InSb  
 SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47,  
 no. 5, 1964, 1683-1686  
 TOPIC TAGS: magnetoresistance, galvanomagnetic effect, indium,  
 antimonide, electron scattering, inelastic scattering, phonon  
 ABSTRACT: This is a continuation of earlier research by some of the  
 authors (Parfen'yev, Shaly't, and V. M. Muzhdaba, ZhETF v. 47, 444,  
 1964) and is devoted to the temperature dependence of the oscilla-  
 tions of longitudinal magnetoresistance of n-InSb in a strong mag-  
 netic field. These oscillations were first predicted theoretically  
 by V. L. Gurevich and Yu. A. Firsov (ZhETF v. 40, 199, 1961) and

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L 34789-65

ACCESSION NR: AP5000314

are due to inelastic scattering of electrons by optical lattice vibrations. The tests were made on single crystal n-InSb ( $n = 4 \times 10^{13} \text{ cm}^{-3}$ ,  $\mu = 4.9 \times 10^5 \text{ cm}^2/\text{V-sec}$  at  $T = 90\text{K}$ ) in the temperature range from 90 to 200K. The results show that with increasing temperature the minima of the oscillating part of the magnetoresistance move away from the resonant values of the magnetic field, and are replaced by maxima. The reason for this shift is attributed to the role played by optical phonons in the scattering of electrons in pure n-InSb, which increases with increasing temperature. A noticeable change in the electron concentration (by a factor of 30) does not result in a noticeable phase shift of the oscillation curves. Orig. art. has: 2 figures and 1 formula.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences SSSR); Institut fiziki poluprovodnikov Akademii nauk SSSR (Institute of Semiconductor Physics, Academy of Sciences SSSR)

Card 2/3

PARFEN'YEV, R.V.; POGARSKIY, A.M.; FARESHTEYN, I.I.; SHALYT, S.S.

Galvanomagnetic properties of tellurium. Valence band structure.  
Fiz.tver.tela 4 no.12:3596-3611 D '62. (MIRA 15:12)

1. Institut poluprovodnikov AN SSSR, Leningrad.  
(Tellurium—Electric properties)  
(Tellurium—Magnetic properties)



L 11078-65 EWT(m)/EWP(u)/EWP(b) IJP(c) JD

ACCESSION NR: AP4046656

S/0181/64/006/010/3194/3196

AUTHORS: Muzhdaba, V. M.; Parfen'yev, R. V.; Shaly\*t, S. S. (L)

TITLE: Magnetophonon oscillation of the thermal emf of n-InSb in  
a longitudinal magnetic field <sup>21</sup>

SOURCE: Fizika tverdogo tela, v. 6, no. 10, 1964, 3194-3196

TOPIC TAGS: magnetophonon resonance, thermal emf, indium antimonide  
magnetoresistance, magnetothermal emf

ABSTRACT: The authors have shown experimentally that the magnetophonon resistance, first treated theoretically by Gurevich and Firsov (ZhETF v. 40, 199, 1961 and v. 41, 512, 1961) is manifest in another kinetic effect, namely the dependence of the thermal emf of InSb on the intensity of the longitudinal magnetic field. This experimental effect was already mentioned briefly by S. M. Puri and T. H. Geballe (Bull. Am. Phys. Soc. v. 8, 309, 1963). A plot of

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L 1078-45

ACCESSION NR: AP4046656

the relative value of the longitudinal magnetothermal emf against the magnetic field intensity, taken at different temperatures (Fig. 1 of the enclosure), discloses an oscillation similar to that disclosed by the magnetoresistance. The difference in the new effect, however, is that the magnetothermal emf, unlike the magnetoresistance, exhibits neither minima nor maxima near the resonant values of the magnetic field, but some intermediate values. As in the case of the longitudinal magneto-resistance, the maxima and minima shift towards weaker fields, although to a lesser degree. The sample of n-type indium antimonide used in the investigation had a concentration  $n = 3.5 \times 10^{13} \text{ cm}^{-3}$  and a mobility  $u = 5.6 \times 10^5 \text{ cm}^2/\text{V-sec}$  at  $T = 77^\circ\text{K}$ ; its thermal emf in the absence of a field increased from 585  $\mu\text{V/deg}$  at 83.4K to 645  $\mu\text{V/deg}$  at 150K. The absolute value of the thermal emf increased in the magnetic field. Similar tests made in a transverse magnetic field showed no noticeable oscillation. This agrees with the theoretical conclusion that the thermal emf in an extremely strong transverse field does not depend on the

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11078-55

ACCESSION NR: AP4046656

4

mechanism whereby the carriers are scattered. "We are grateful to Yu. A. Firsov and S. T. Pavlov for a discussion of the theoretical problems and to student G. A. Kurbatov for help with the measurements." Orig. art. has: 1 figure and 1 formula.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 13Jun64

ENCL: 01

SUB CODE: SS, EM

NR REF SOV: 002

OTHER: 001

Card 3/4

L 11078-65

ACCESSION NR: AP4046656

ENCLOSURE: 01

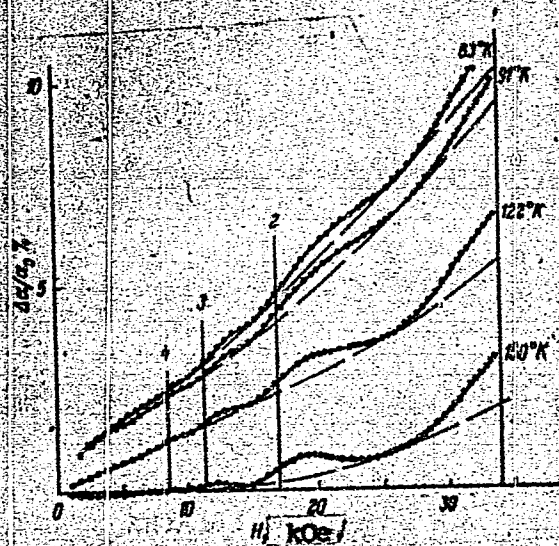


Fig. 1. Experimental plots of the thermal emf of n-InSb vs. magnetic field intensity for different temperatures.

The vertical lines 1, 2, 3, and 4 denote the calculated resonant values of the magnetic field.

The dashed lines tangent to the minima of the oscillating curves are drawn to illustrate the oscillating part of the thermal emf.

Card 4/4

PARFEN'YEV, R.V.; SHALYT, S.S.; MUZHDABA, V.M.

Experimental testing of magnetophonon resonance in n-InSb. Zhur. eksp.  
i teor. fiz. 47 no.2:444-451 Ag '64. (MIRA 17:10)

1. Institut poluprovodnikov AN SSSR.

L 6931-66

ACCESSION NR: AP5000314

S/0056/64/047/005/1683/1686

AUTHORS: Shaly't, S. S.; Parfen'yev, R. V.; Aleksandrova, M. V. 14/B

TITLE: Concerning a new type of oscillation of longitudinal magnetoresistance of n-InSb

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 47, no. 5, 1964, 1683-1686

TOPIC TAGS: magnetoresistance, galvanomagnetic effect, indium antimonide, electron scattering, inelastic scattering, phonon

ABSTRACT: This is a continuation of earlier research by some of the authors (Parfen'yev, Shaly't, and V. M. Muzhdaba, ZhETF v. 47, 444, 1964) and is devoted to the temperature dependence of the oscillations of longitudinal magnetoresistance of n-InSb in a strong magnetic field. These oscillations were first predicted theoretically by V. L. Gurevich and Yu. A. Firsov (ZhETF v. 40, 199, 1961) and

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L 6931-66

ACCESSION NR: AP5000314

are due to inelastic scattering of electrons by optical lattice vibrations. The tests were made on single crystal n-InSb ( $n = 4 \times 10^{13} \text{ cm}^{-3}$ ,  $\mu = 4.9 \times 10^5 \text{ cm}^2/\text{V-sec}$  at  $T = 90\text{K}$ ) in the temperature range from 90 to 200K. The results show that with increasing temperature the minima of the oscillating part of the magnetoresistance move away from the resonant values of the magnetic field, and are replaced by maxima. The reason for this shift is attributed to the role played by optical phonons in the scattering of electrons in pure n-InSb, which increases with increasing temperature. A noticeable change in the electron concentration (by a factor of 30) does not result in a noticeable phase shift of the oscillation curves. Orig. art. has: 2 figures and 1 formula.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences SSSR); Institut fiziki poluprovodnikov Akademii nauk SSSR (Institute of Semiconductor Physics, Academy of Sciences SSSR)

Card 2/3

1. 69:3-66

ACCESSION NR: AP5000314

SUBMITTED: 03May64

SUB CODE: 88

NR REF SOV: 003

ENCL: 00

OTHER: 001

Card

3/3 nls



MASHOVETS, D.V.; PARFEN'YEV, R.V.; SHALYT, S.S.

Recent data on magnetophonon oscillations of the longitudinal  
magnetoresistance in n-InSb. Zhur. eksp. i teor. fiz. 47:16.6:  
2007-2009 N 164. (MIRA 1-1)

1. Institut poluprovodnikov AN SSSR.

L 65250-55 EWT(1)/ENT(m)/EPF(c)/EWP(t)/EWP(b) IJP(c) WW/JD/GG

ACCESSION NR: AP5014231

UR/0386/65/001/003/0002/0007

AUTHOR: Iamovats, D. V.; Parfen'yev, R. V.; Shalyt, S. S.

TITLE: Magnetophonon resonance in  $n$ -InAs

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 1, no. 3, 1965, 2-7

TOPIC TAGS: longitudinal magnetic field, polycrystal, indium compound, arsenide, magnetoresistance, magnetic field intensity, semiconductor crystal

ABSTRACT: Under proper conditions, the effect of the field on magnetoresistance and magnetothermoelectromotive force in  $n$ -InSb takes on an oscillating character due to magnetophonon resonance. The physical nature of this new effect is associated with the fact that nonelastic scattering of electrons by optical phonons increases when the distance between Landau levels becomes equal to the energy of the optical phonons. In this paper, the authors studied the longitudinal magnetoresistance of polycrystalline  $n$ -InAs specimens,  $n = 1.25 \cdot 10^{16} \text{ cm}^{-3}$ ,  $U_{90^\circ K} = 6 \cdot 10^4 \text{ cm}^2/\text{v} \cdot \text{sec}$ . Curves for longitudinal magnetoresistance as a function of field strength are shown in fig. 1 and 2 of the Enclosure for a stationary and a pulsed magnetic

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L 65260-45

ACCESSION NR: AP5014231

3

field. Investigations of the transverse magnetoresistance in  $n$ -InAs for the same range of temperatures and fields showed no noticeable oscillations. Orig. art. has: 2 figures, 2 formulas.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences, SSSR)

44, 55

SUBMITTED: 18Mar65

ENCL: 02

SUB CODE: EM, SS

NO REF NO: 002

OTHER: 004

Card 2/4

L 652611-65

ACCESSION NR: AP5014231

ENCLOSURE: 01

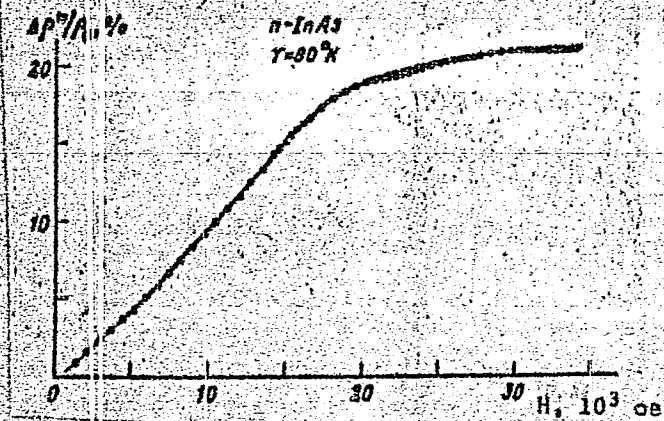


Fig. 1. Magnetoresistance of n-InAs as a function of longitudinal field strength at 90°K.

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L 65260-65

ACCESSION NR: AP014231

ENCLOSURE: 02

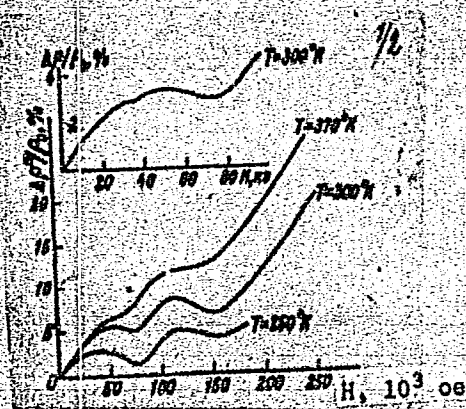


Fig. 2. Magnetoresistance of  $n$ -InAs as a function of longitudinal field strength in a pulsed magnetic field at various temperatures.

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L 51549-4 EWT(1)/EWT(m)/EPA(w)-2/EEC(t)/ENP(t)/ENP(b)/EWA(m)-2 P1-1/P2-6  
 ACCESSION NR: AP5010758 IJP(c) JD/AT UR/0181/65/007/004/1266/1268

AUTHOR: Bresler, M. S.; Parfen'yev, R. V.; Shalyt, S. S.

TITLE: Concerning the effect of the electron spin on the Shubnikov--deHaas oscillations in n-InSb 21

SOURCE: Fizika tverdogo tela, v. 7, no. 4, 1965, 1266-1268

TOPIC TERM: Shubnikov deHaas effect, magnetoresistance, electron spin, indium antimonide, single crystal

ABSTRACT: The authors investigated experimentally the transverse and longitudinal magnetoresistance of single-crystal InSb ( $1.5 \times 2 \times 17$  mm) with concentration  $n = 1.5 \times 10^{16} \text{ cm}^{-3}$  at  $T = 1.4\text{K}$ , in order to check against the theory of L. E. Gurevich and M. L. Efros (ZhETF v. 43, 561, 1962) dealing with the Shubnikov--deHaas effect. The results have shown that the spin splitting of the first maximum of the magnetoresistance, which is expected from the theory, can be clearly seen in the transverse magnetoresistance and is less pronounced although visible on the longitudinal magnetoresistance curve. The numerical values obtained for the corresponding magnetic field differ from the theoretical predictions but it is shown that in

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L 51519-65

ACCESSION NR: AP5010758

view of the uncertainty relation better accuracy cannot be expected under the experimental conditions. "We thank S. T. Pavlov, Yu. A. Firsov, and A. L. Efros for a discussion of the theoretical questions connected with the investigated phenomenon, and D. V. Mashovets for help with the measurements." Orig. art. has: 1 figure and 2 formulas.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)


SUBMITTED: 27 Nov 64

ENCL: 00

SUB CODE: SS, NP

NR REF SOV: 004

OTHER: 001

  
Card 2/2

L 6457-66 EWT(1)/ETC/EWG(m)/T/EWA(g) IJP(c) AT  
 ACCESSION NR: AP5019853 UR/0181/65/007/008/2379/2382

AUTHOR: Muzhdaba, V. M.; Parfen'yev, R. V.; Shalyt, S. S.

TITLE: Magnetophonon oscillation of the thermoelectric power in n-InSb in a longitudinal magnetic field

SOURCE: Fizika tverdogo tela, v. 7, no. 8, 1965, 2379-2382

TOPIC TAGS: thermoelectric power, phonon, phonon interaction, indium compound, magnetoresistance, electron mobility

ABSTRACT: This is a continuation of earlier work by the authors (FTT v. 6, 3193, 1964; ZhETF v. 47, 444, 1964) dealing with magnetophonon resonance in the thermoelectric power and magnetoresistance of n-InSb. The present article contains additional experimental results, showing how the magnetophonon resonance manifests itself in samples with various electron densities and mobilities, and covering a wider range of temperatures ( $5.5 \times 10^{13}$ -- $3.9 \times 10^{17} \text{ cm}^{-3}$ ,  $3.7 \times 10^4$ -- $7 \times 10^5 \text{ cm}^2/\text{v. sec}$ , 68--300K). Oscillations were observed in the dependence of the magnetic thermoelectric power on the field, due to the magnetophonon resonance, in agreement with the theoretical predictions of V. L. Gurevich and Yu. A. Firsov (ZhETF v. 40, 199, 1951). The oscillations have a maximum near 200K and decrease both at lower and at higher temperatures. They also decrease with decreasing mobility at a fixed

Cont 1/2



L 5457-66

ACCESSION NR: AP5019853

temperature. The concentration has a rather complex effect on the thermoelectric power. Orig. art. has: 4 figures, 2 formulas, and 1 table.

ASSOCIATION: Institut poluprovodnikov AN SSSR, Leningrad (Institute of Semiconductors AN SSSR)

SUBMITTED: 26 Feb 65

NR REF S/W: 007

ENCL: 00

OTHER: 000

SUB CODE: NP, EM

Card 2/2

529/1-65 ENT(1)/EWT(m)/EWG(m)/EPR/T/EWP(t)/EWG(c)/EWP(b) Pz-6/ps-4 IJP(c)  
 ACCESSION NO: AP5010526 JD/AT UR/0056/65/048/004/1212/1214  
 AUTHOR: Shalyt, S. S.; Parfen'yev, R. V.; Bresler, M. S.  
 TITLE: Quantum oscillations of the thermoelectric power in n-type InSb  
 SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 4, 1965,  
 1212-1214  
 TOPIC TAGS: quantum oscillation, thermoelectric power, magnetoresistance, galvanomagnetic effect, spin splitting  
 ABSTRACT: The authors found that at helium temperatures the thermoelectric power of InSb in a transverse magnetic field exhibits the same oscillatory dependence as the transverse magnetoresistance. The study was made on a single-crystal sample of InSb ( $2.7 \times 3 \times 40$  mm) with carrier density  $n(H \rightarrow 0) = 1.32 \times 10^{16} \text{ cm}^{-3}$  and mobility  $\mu = 9 \times 10^4 \text{ cm}^2/\text{V-sec}$  (at  $T = 4.2\text{K}$ ). It is deduced that the quality of the maxima of the oscillations of both quantities is not a trivial function of the temperature. The oscillations are determined to a considerable extent by the thermoelectric power.

degree by the periodic variations in the theory even without  
electric power oscillations appear in the theory even without

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52971-65

ACCESSION NR: AP5010526

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due only to oscillations of the entropy. As in an earlier study by the authors  
(Fiz. v. 7, 1276, 1965), there is appreciable broadening of the Landau levels and  
it is still impossible to estimate the g-factor with acceptable accuracy, in spite  
of the use of stronger fields (22--30 kOe) in which the spin splitting appears  
more clearly. We are grateful to A. L. Efros and Ya. N. Osipov for discussing

the theoretical problems." Orig. art. has: 2 figures and 1 formula.

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences SSSR)

SUBMITTED: 28 Jan 65

EXCL: 00

SUB CODE: 88

IN KEY SCV: 006

OTHER: 001

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L 00967-56 EAT(1) IJP(c)

ACCESSION NR: AP5016547

UR/0056/65/048/006/1565/1571

AUTHOR: Pavlov, S. T.; Parfen'yev, R. V.; Firsov, Yu. A.; Shalyt, S. S.

TITLE: The effect of electron spin on the quantum oscillations of the galvanomagnetic coefficients of n-type InSb

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 48, no. 6, 1965, 1565-1571

TOPIC TAGS: indium antimonide, quantum oscillation, Hall coefficient, magnetoresistance, electron spin effect, quantizing magnetic field

ABSTRACT: The authors investigated the galvanomagnetic properties of single crystals of n-type InSb in an electromagnet that produced a constant field up to 30 kOe at  $T = 1.4K$ . The investigation showed that in the region of the magnetic field where the transverse magnetoresistance curve exhibits the zeroth maximum an oscillation of the Hall coefficient is also observed, and that this oscillation has a much greater amplitude than the oscillation of the same coefficient near the Landau levels with higher quantum numbers. Some questions connected with the effect of a strong quantizing magnetic field on the energy spectrum, and the conditions of the electron scattering in an n-type InSb crystal, are considered in connection with the experimental results. Orig. art. has: 7 formulas and 2 figures.

Card 1/2

L 00967-66

ACCESSION NR: AP5016547

ASSOCIATION: Institut poluprovodnikov Akademii nauk SSSR (Institute of Semiconductors, Academy of Sciences, SSSR)

SUBMITTED: 06Jan65

ENCL: 00

SUB CODE: SS

NR REF SCV: 006

OTHER: 002

Card 2/2

L 11392-67 EWT(1)/EWT(m)/EWP(t)/ETI IJP(c) AT  
ACC NR: AP7000394

SOURCE CODE: UR/0386/66/004/009/0348/0352

AUTHOR: Bresler, M. S.; Parfen'yev, R. V.; Red'ko, N. A.; Shalyt, S. S. 3/

ORG: Institute of Semiconductors, Academy of Sciences SSSR, Leningrad (Institut poluprovodnikov Akademii nauk SSSR)

TITLE: Nernst effect in n-InSb in a quantizing magnetic field

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki. Pis'ma v redaktsiyu. Prilozheniye, v. 4, no. 9, 1966, 348-352

TOPIC TAGS: Nernst effect, indium compound, antimonide, magnetoresistance, galvanomagnetic effect, low temperature research

ABSTRACT: This is a continuation of earlier experiments (FTT v. 8, 1776, 1966) where it was shown that quantization of the energy spectrum of the electrons of indium antimonide placed in a strong magnetic field becomes manifest at low temperatures in an oscillating field dependence of a number of kinetic coefficients. Since some of these results cannot be explained by the existing theory and call for further study, the authors have investigated the thermomagnetic Nernst effect in n-InSb. The experimental conditions (temperature, carrier density, range of magnetic fields) were such that they observed for the first time oscillations of the Nernst effect in a semiconductor, and were also able to follow continuously the sharp decrease of the Nernst coefficient in the classical region of strong fields ( $\omega H/c \gg 1$ ), its transition in the region of quantum oscillations ( $\hbar \geq kT$ ), and the subsequent transition to the

Card 1/2

L 11392-67

ACC NR: AP700039+

region of the quantum limit ( $\hbar\Omega \ll \xi$ ) ( $u$  = mobility,  $\xi$  = chemical potential,  $\Omega$  = cyclotron frequency). To determine the phase relations, the Nernst-coefficient curve was compared with the plots of the magnetoresistance and the magnetothermal emf in a transverse field and with the plot of the Hall coefficient, obtained simultaneously in the investigation of single-crystal n-InSb. The system of maxima on the plot of the Nernst coefficient  $A$  forms a periodic sequence in the reciprocal field which coincides with the periodicity of the magnetoresistance and magnetothermal-emf curves, but the oscillating Nernst-effect curve is shifted relative to the in-phase magnetoresistance and magnetothermal-emf curves in a transverse field by four periods, similar to the shift observed earlier for the magnetothermal emf in a longitudinal field. It is concluded that the results cannot be adequately interpreted theoretically until more data become available. Orig. art. has: 1 figure and 1 formula.

SUB CODE: 20/ SUBM DATE: 20Jul66/ ORIG REF: 001/ OTH REF: 001

Card 2/2 egk



1. 29623-66 EWT(1)/ETC(f)/T IJP(c) AT

ACC NR: AP6018539

SOURCE CODE: UR/0181/66/008/006/1776/1786

AUTHOR: Bresler, M. S.; Parfen'yev, R. V.; Shalyt, S. S.

ORG: Institute of Semiconductors, AN SSSR, Leningrad (Institut poluprovodnikov AN SSSR)

TITLE: Quantum oscillation of the thermal emf in n-InSb

SOURCE: Fizika tverdogo tela, v. 8, no. 6, 1966, 1776-1786

TOPIC TAGS: semiconductor research, semiconductor alloy, indium compound, oscillation, thermoelectric property, magnetic effect

ABSTRACT: Quantum oscillations of the transverse and longitudinal magneto-thermal emf were experimentally investigated in n-type InSb at helium temperatures. The dependence of various kinetic coefficients on the intensity of the magnetic field was carefully studied. Spin-dependent splitting of the Landau energy spectrum was detected in samples with an electron concentration of  $3.1 \times 10^{16} \text{ cm}^{-3}$ . The g-factor was calculated from the value obtained for the spin. It was found that spin-splitting is larger in the longitudinal field than in the transverse field, and that the effective g-factor in the longitudinal field has a value close to the expected (50). The phase shift of oscillating coefficients of the longitudinal and transverse magneto-thermal emf and the rules governing the increase of these coefficients in the region of the quantum limit were also determined. A comparison of experi-

Card 1/2

PARFESSA, G.A.; KHARCHENKO, G.K.; SIDLYARENKO, V.A.

Pickling of weld joints in dissimilar high-melting metals.  
Avtom. svar. 15 no.1:88-89 Ja '62. (MIRA 14:12)  
(Metals—Pickling)

PARFESSA, G. I.

18 18  
Electrolytic polishing of welded seams made upon low-carbon, low alloy and stainless special steels. A. A. Rossozhinski and G. I. Parfessa (E. O. Paton's Inst. Electric Welding, Kiev). Avtomat. Svarka 8, No. 5, 81-4 (1955).—A method of electrolytic polishing is described with an electrolyte composed of 80% by vol.  $H_3PO_4$  (d. 1.7) and 20% satd. aq. soln. of  $Cr_2O_3$ , at 92-4° and 7.5-8.0 v, for 1-2 min. A. N. Pestoff

452 c

Rob  
amb

Parfessa, G.I.

AUTHORS: Parfessa, G.I., and Rossoshinskiy, A.A.

125-1-13/15

TITLE: Electrolytic Polishing of Welded Seams on Titanium (Elektroliticheskaya polirovka svarnykh shvov na titane)

PERIODICAL: Avtomaticheskaya Svarka, 1958, # 1, pp 87-88 (USSR)

ABSTRACT: The determination of the welded seam structure in titanium is accomplished with considerable difficulties. Mechanical polishing of titanium samples gives rise to deformations, therefore electrolytic welding is recommended in order to obtain seams with undeformed surfaces. There is, however, little information on this subject in literature. This article contains information on some reagents and electrolytic polishing processes which have given satisfactory results. For this purpose the usual device designed at the Institute of Electrowelding is utilized. The author recommends reagent No 1, to be used at a temperature of 26 - 30° C. The time of electrolytic etching depends on the preceding surface treatment of the sample, which should be finished on a felt disc with FAW -paste; in which case the time of electrolytic polishing should not exceed 10 - 30 seconds. Reagent No 2, composed of ethylene glycol and hydrofluoric acid, produces better results in stability.

Card 1/2

Electrolytic Polishing of Welded Seams on Titanium

125-1-13/15

There is 1 Russian reference.

ASSOCIATION: The Institute of Electrowelding imeni Ye.O. Paton (Institut elektrosvarki imeni Ye.O. Patona) of the Ukrainian SSR Academy of Sciences

SUBMITTED: 24 August 1957

AVAILABLE: Library of Congress

Card 2/2

Parfessa, G.I.

125-1-14/15

AUTHORS: Sidlyarenko, V.A., Parfessa, G.I., Rossoshinskiy, A.A.

TITLE: Detection of Crystallization Layers in Welded Seams by Methods of Electrolytic Etching (Vyyavleniye kristallizatsionnykh sloyev svarnykh shvov metodom elektroliticheskogo travleniya)

PERIODICAL: Avtomaticheskaya Svarka, 1958, # 1, pp 89-90 (USSR)

ABSTRACT: Crystallization layers in welded seams are detected by electrolytic etching, with the aid of the usual devices. The reagent is a 20% aqueous solution of sulphuric acid (density 1.84). The voltage at the etching bath terminals is 0.5 v. Figure No 1 shows crystallization layers in the seam, detected by this method which is recommended for use by metallographic laboratories because of its simplicity and reliability.  
There is one figure and 3 Russian references.

ASSOCIATION: Institute of Electrowelding imeni Ye.O. Paton (Institut elektrosvarki imeni Ye.O. Patona) of the Ukrainian SSR Academy of Sciences.

SUBMITTED: 2 August 1957

AVAILABLE: Library of Congress

Card 1/1

AUTHOR: Parfessa, G.I., and Sidlyarenko, V.A. 125-58-7-14/14  
TITLE: A Universal Electrolyte for Polishing Stainless, Heat-Resistant Low-Carbon Steels and "VT-5" Titanium Alloy (Universal'nyy elektrolit dlya polirovki nerzhaveyushchikh, teploustoychivyykh malouglerodistykh staley i titanovogo splava VT-5)  
PERIODICAL: Avtomaticheskaya svarka, 1958, Nr 7, pp 82-84 (USSR)  
ABSTRACT: Information is presented on a new method of electrolytic polishing of welded joints with the use of electrolytes possessing comparatively low electric resistance and not interacting with metals under usual process conditions. The electrolyte consists of 500 cm<sup>3</sup> glacial acetic acid and 16.5 cm<sup>3</sup> perchloric acid. The process parameters for different grades of steel and "VT-5" titanium alloy are given. There are 3 photos.  
ASSOCIATION: Institut elektrosvarki imeni Ye.O. Patona AN USSR (Institute of Electric Welding imeni Ye.O. Paton, AS UkrSSR)  
SUBMITTED: April 26, 1958

1. Welded joints--Electrolytic polishing 2. Electrolytes--Properties

Card 1/1

USCOMM-DC-55356

AUTHORS: Sidlyarenko, V. A., Parfessa, G. I., SOV/32-24-10-17/70  
Rossoshinskiy, A. A.

TITLE: The Development of Crystallisation Layers at Weld Seams  
According to the Method of Electrolytic Etching (Vyyavleniye  
kristallizatsionnykh sloyev svarnykh shvov metodom elektro-  
liticheskogo travleniya)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 10,  
pp 1217 - 1217 (USSR)

ABSTRACT: The development of crystallisation layers in weld seams  
at lowly-and middle-alloyed steels that are low in  
carbon is connected with some difficulties (Ref 1).  
In the present case electrolytic etching is employed.  
A 20 per cent solution of sulfuric acid (density 1,84)  
served as reagent. The cathode was a lamella of stainless  
steel the surface of which was 1,5 - 2 times larger  
than the surface of the sample to be etched. The distance  
between the electrodes was about 35 mm. The terminal  
voltage was 0,5 volts. The duration of etching was 6  
hours. After the process of etching the sample is carefully  
cleaned, washed, and dried. A microphoto of a weld sample

Card 1/2



The Development of Crystallisation Layers at Weld Seams SOV/32-24-10-17/70  
According to the Method of Electrolytic Etching

is shown in a figure; the crystallisation layers obtained  
according to the described method are clearly visible.  
There are 1 figure and 2 references which are Soviet.

Card 2/2

SOV/125-12-2-2/14

18(5,7)

AUTHOR:

Sterenbogen, Yu.A., Poznyak, L.A., and Parfessa, G.I.

TITLE:

Intracrystalline Liquation of Phosphorus in Electric-Welded Joints on Carbonaceous Steel (Vnutrikristallicheseskaya likvatsiya fosfora v elektroshlakovykh shvakh na uglerodistoy stali)

PERIODICAL:

Avtomaticheskaya svarka, 1959, Vol 12, Nr 2, pp 20-27 (USSR)

ABSTRACT:

The article cites results of radiographic and metallographic research in this field. It is shown that for joints welded in carbonaceous steel, the liquation sectors of phosphorus depend on the quality of electrically-welded joints. It can be assumed that the presence of phosphorus in electro-welded joints causes a reduction in the strength of the metal of the joint. 4 pages are then devoted to research into the distribution of phosphorus in an electro-welded joint, and it is shown that in joints made using the electric arc method beneath the flux, as a result of the high speed of crystallization,

Card 1/3

SOV/125-12-2-2/14

Intracrystalline Liquation of Phosphorus in Electric-Welded Joints  
on Carbonaceous Steel

conditions do not exist for the development of intracrystalline liquation of phosphorus, as happens in steel foundry work. Weakly discernible liquation is observed in joints with 0.25% carbon and 0.1% phosphorus. Soviet research demonstrates that an increase in the phosphorus content expands the temperature interval for the crystallization of the metal of the joint and strengthens the structure during primary crystallization which increases the tendency of the seam to form heat cracks. The peculiarities of the crystallization of metal, which are caused by increased phosphorus content cannot, in the authors' opinion, fail to increase the influence of sulphur on the tendency of the metal to form heat cracks. The shock strength of joints in carbonaceous steel can be increased either by reducing the phosphorus content in a given concentration of carbon, or by the fragmentation of the primary structure. The conclusions drawn are first that the uneven distribution of phosphorus in welded joints can be removed by high temperature heating

Card 2/3

Intracrystalline Liquation of Phosphorus in Electric-Welded Joints  
on Carbonaceous Steel

SOV/125-12-2-2/14

followed by rapid cooling. Secondly the intracrystalline liquation of phosphorus depends on the carbon content in the joints and on the conditions under which the metal of the welding bath crystallizes. There are 3 tables, 7 diagrams, 1 graph and 7 Soviet references.

ASSOCIATION: Ordena trudovogo krasnogo znameni institut elektrosvarki imeni Ye.O.Patona ~~AN~~ USSR (Order of the Red Banner of Labor Institute of Electric Welding imeni Ye.O.Pator of the AS UkrSSR)

SUBMITTED: December 2, 1958

Card 3/3

SOV/125-12-2-4/14

18(5)

AUTHOR: Morozovskaya, Ye.N., and Parfessa, G.I.

TITLE: The Influence of the Cooling Rate on the Structure of Smelted Metal Type 3Kh2V8 (Vliyaniye skorosti okhlazhdeniya na strukturu naplavlennogo metalla tipa 3Kh2V8)

PERIODICAL: Avtomaticheskaya svarka, 1959, Vol 12, Nr 2, pp 29-48 (USSR)

ABSTRACT: The article describes research into the structure of Metal 3X2V8 smelted at various temperatures in various conditions. It also studies the products of the disintegration of Austenite at cooling rates of  $0.01 \div 630$  per second. At cooling rates of more than  $150^\circ$  a second a Martensite transformation of Austenite takes place at a temperature of  $4300^\circ$ ; at cooling rates of  $15 \div 0.10$  a second disintegration takes place at about  $4500^\circ$  with the formation of needle troostite and the discharge of surplus carbides; at cooling rates of less than  $0.10$  the disintegration of Austenite takes place at temperatures between  $870-6300^\circ$  and perlite is formed. The mini-

Card 1/3

SOV/125-12-2-4/14

The Influence of the Cooling Rate on the Structure of Smelted Metal  
Type 3Kh2V8

minimum stable temperature for Austenite is  $730^{\circ}$ . Experiments in smelting using various thermal cycles are described, the basic cycle being instantaneous cooling at the minimum stable temperature for Austenite. The methodology for the experiments is looked at, followed by the structure of the smelted metal. It is found that a reduction in the cooling speed reduces the quantity of Martensite, and in the final analysis the whole structure consists of sorbito-perlite. The authors then deal with the mechanism of the formation of the structure, and also with surplus phases. A deposit of smelted metal cooled at  $10^{\circ}$  a second contained:  $Fe_3C$ ,  $W_2C$ ,  $Fe_3W_3C$ ,  $Fe_3W_2$ . The chemical composition of deposit was: 2.55% Fe, 0.09% Cr, 1.1% W (the whole of the metal being 100%). The conclusions are that 3Kh2V8 when smelted has a number of valuable qualities determined by the microstructure of the smelted metal. This structure is determined by the initial temperature of the basic metal.

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SOV/125-12-2-4/14

The Influence of the Cooling Rate on the Structure of Smelted Metal  
Type 3Kh2V8

Secondly, at less than 200% a structure of Martensite is formed with reduced hardness and with insufficient durability. The best technological properties are possessed by metal smelted with preliminary heating of the basic metal to 300-600°; it has a structure of needle-form troostite and martensite which ensure stability and strength. In the smelted state of 3Kh2V8 the surplus phases which strengthen the matrix of the metal consist of alloyed cementite, very stable double carbide wolfram (Fe W)<sub>6</sub> C, alloyed chrome and vanadium and wolframide Fe<sub>3</sub>W<sub>2</sub>. There are 1 graph, 12 illustrations, 1 table and 3 references, 8 of which are Soviet and 1 German.

ASSOCIATION: Ordena trudovogo krasnogo znameni institut elektrosvarki imeni Ye.O.Paton AN USSR (Order of the Red Banner of Labor Institute of Electric Welding imeni Ye.O.Paton of the AS UkrSSR)

SUBMITTED: August 27, 1958  
Card 3/3

18(7)

SOV/32-25-2-30/78

AUTHORS:

Parfessa, G. I., Rossochinskiy, A. A.

TITLE:

Electrolytic Polishing to Render Visible the Structure of Welding Seams on Titanium (Elektroliticheskaya polirovka dlya vyyavleniya struktury svarnykh shvov na titane)

PERIODICAL:

Zavodskaya Laboratoriya, 1959, Vol 25, Nr 2,  
p 185. (USSR)

ABSTRACT:

It is very difficult to render visible the structure of welds on titanium, since the titanium surface is distorted when mechanically polished. Therefore, it is necessary to use electrolytic polishing. In the present case a setup already described (Ref 1), modified in such a way as to supply 60-250 v d.c. at 3 amperes was used for determining optimum conditions. The following reagent is suggested: 180 ml ethanol, 20 ml methanol, 12 g  $AlCl_3$  (dehydrated), 56 g  $ZnCl_2$  (dehydrated).

Cathodes: stainless steel plates. Distance between electrodes: 40 mm. Current density: appr.  $0.2-0.3 \text{ a/cm}^2$  at 140 volts.

Electrolyte temperature:  $26-30^\circ$  at most. Duration of electrolytic polishing depends on the pre-treatment of the sample.

Card 1/2



Electrolytic Polishing to Render Visible the Structure of SOV/32-25-2-30/78  
Welding Seams on Titanium

Preliminary polishing with the "GOI" paste on a felt disc  
is recommended as reducing electrolytic polishing to 10-30  
seconds. There is 1 Soviet reference.

ASSOCIATION: Institut elektrosvariki im. Ye. O. Patona Akademii nauk USSR  
(Institute of Electric Welding imeni Ye. O. Paton of the Academy  
of Sciences, UkrSSR)

Card 2/2

PARFESSA, G.I.; PODGAYETSKIY, V.V.; GORDAN', G.N.

Sulfide interlayers in welded joints. Avtom.svar. 18 no.11:10-14.  
(MIRA 18:12)  
N '65.

1. Institut elektrosvariki im. Ye.O.Patona AN UkrSSR. Submitted  
March 1, 1965.

PODGAYETSKIY, V.V.; PARFESSA, G.I.; MANZHELEY, G.P.

Investigating the composition and from of sulfides in weld  
joints. Avtom. svar. 16 no.8:34-37 Ag '63. (MIRA 16:8)

1. Institut elektrosvarki imeni Ye.O. Patona AN UkrSSR.  
(Welding--Testing) (Sulfides)

PARFESSA, G.M.; SIDLYATEL O, V.A.; IHARGHENKO, G.K.

Polishing and pickling of welded joints in molybdenum.  
Avtom. svar. 14 no.11:84-85 K '61. (MIRA 14:10)  
(Molybdenum--Metallography)  
(Electrolytic polishing)

S/125/61/000/011/011/012  
D040/D113

AUTHORS: Parfessa, G.I., Sidlyarenko, V.A. and Kharchenko, G.K.

TITLE: Polishing and etching molybdenum welds

PERIODICAL: Avtomaticheskaya svarka, no. 11, 1961, 84-85

TEXT: The metallographic laboratory of the Institut elektrosvarki (Electric Welding Institute) has developed and is using new electrolytes and etching solutions for molybdenum welds. It is mentioned that the usually recommended electrolytes for metallographic polishing caused pitting. The new compounds give satisfactory results. The compositions and process data are as follows: ✓

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S-125/61/000/011/011/012  
D040/D113

Polishing and etching ...

No.	Composition of electro- lyte	Purpose	Vol- tage, v.	Current density, amp/cm <sup>2</sup>	Dur- ation, sec	Anode to cathode space, mm	Remarks
1	2	3	4	5	6	7	8
3	40 ml H <sub>2</sub> SO <sub>4</sub> (d = 1.84), 70 ml HCl (d = 1.19) 200 ml methyl alcohol	as above	32	0.2	5	30	Polishing
			3 ÷ 5	0.15 ÷ 0.2	15	25 ÷ 30	Etching
4	Murakami re- agent: 10 g KOH, 10 g K <sub>3</sub> Fe (CN) <sub>6</sub> , 80 ml H <sub>2</sub> O	Etching	3 ÷ 5	0.25	3 ÷ 10	25 ÷ 30	Recommended electrolyte

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S/125/61/000/011/011/012  
D040/D113

Polishing and etching ...

No.	Composition of electro- lyte	Purpose	Vol- tage, v.	Current density, amp/cm <sup>2</sup>	Dur- ation, sec	Anode to cathode space, mm	Remarks
1	2	3	4	5	6	7	8
5	50 ml HCl (d = 1.19), 20 ml H <sub>2</sub> SO <sub>4</sub> (d = 1.84), 150 ml methyl alcohol	Etching	3 ÷ 5	0.25	3 ÷ 10	32	Recommended electrolyte
6	0.5 g FeCl <sub>3</sub> , 1 ml HCl (d = 1.19), 98 ml methyl alcohol	"	5	0.2	5 ÷ 6	30	

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S/125/61/000/011/011/012  
D040/D113

Polishing and etching ...

No.	Composition of electro- lyte	Purpose	Vol- tage, v.	Current density, amp/cm <sup>2</sup>	Dur- ation, sec	Anode to cathode space,mm	Remarks
1	2	3	4	5	6	7	8
7	0.5-percentage water solution of oxalic acid	Etching	3 ÷ 5	0.25	2 ÷ 3	22	

Note: Cathode of stainless steel

The electrolytes Nos. 2 and 3 permit polishing and etching in the same so-  
lution, which is very convenient. The No. 1 electrolyte is durable and simple  
to prepare, and can be used for polishing after mechanical treatment of spec-  
imens with 100-grain paper or even with a grinding stone. The electrolytes  
Nos. 6 and 7 are used for etching prior to as well as after mechanical polish-

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Polishing and etching ...

S/125/61/000/011/011/012  
D040/D113

ing; however, their use on specimens electrolytically polished gives better results. The oxide film sometimes forming after etching in the No. 7 reagent dissolves readily when submerged in hydrochloric acid. Two photomicrographs are included. There are 2 figures and 1 table. [Abstracter's note: Essentially complete translation]

Card 6/6

MALEVSKIY, Yuzef Boleslavovich; GRABIN, Vladimir Fedorovich; DAROVSKIY, Georgiy Fedos'yevich; PARFESSA, Galina Ivanovna; ROSSOSHINSKIY, A.A., kand.tekhn.nauk, retsenzent; MAKAR, A.M., kand.tekhn.nauk, red.; RIKBERG, D.B., red.; GORNOSTAYPOL'SKAYA, M.S., tekhn.red.

[Atlas of the micro- and macrostructure of welded joints] Atlas makro- i mikrostruktur svarnykh soedinenii. Pod red. A.M. Makara. Moskva. Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry, 1961.  
118 p. (MIRA 15:2)

(Welding--Testing) (Metallography)

1.2300

32961

S/125/62/000/001/010/011  
DO36/D113

AUTHORS: Parfessa, G.I.; Kharchenko, G.K.; Sidlyarenko, V.A.

TITLE: Etching welded joints in dissimilar refractory metals

PERIODICAL: Avtomaticheskaya svarka, no. 1, 1962, 88-89

TEXT: The article contains a table giving the compositions of reagents for chemical etching and electrolytes for electrolytic etching of welds produced by electron beam between dissimilar refractory metals. Two photomicrographs are included.

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S/125/62/000/001/000/011

D036/D113

Etching welded joints in dissimilar ...

TABLE

Struc- ture reveal- ed	Welded metals	Composition of re- agent or electrolyte	Etching	Conditions			Tempera- ture of etching
				etch- ing time	etch- ing temp.	etch- ing conc.	
Micro- struc- ture	Molyb- denum and ti- tanium	2 parts $H_2SO_4$ (d=1.8)	Chemical	-	-	-	λ
		1 part $HNO_3$ (d=1.4)		-	-	-	
	Molyb- denum and ni- obium	2 parts HF (48%)	Chemical	-	-	-	
		1 part $H_2SO_4$ (d=1.8)		-	-	-	
		2 parts $HNO_3$ (d=1.4)					
		2 parts HF (48%)					

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S/125/62/000/001/009/011

D036/D113

Etching welded joints in dissimilar ...

TABLE (contd)

	Molybdenum and tungsten	20% aqueous solution of alkali	Electrolytic	25	0.23	$\geq 5$	17
Micro-structure	Molybdenum and 1X18H9T (1Kh18N9T)	0.5 g FeCl <sub>3</sub> , 1 ml HCl (d=1.19), 98 ml methyl alcohol	Electrolytic	25	0.2	3-5	
Macro-structure	steel	30 ml HNO <sub>3</sub> , 20 g FeCl <sub>3</sub> , 10 ml H <sub>2</sub> O	Chemical	-	-	-	17

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S/125/62/000/001/009/011

D036/D113

Etching welded joints in dissimilar ...

TABLE (contd)

Micro- struc- ture	Molyb- denum and 9M437B (EI437B) steel	20% solution of chromic acid	Electro- lytic	20	0.2	$\geq 3$	
Macro- struc- ture		50% H <sub>2</sub> O, 45% HCl (d=1.19), 5% HNO <sub>3</sub>	Chemical	-	-	-	50-60

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32961  
S/125/62/000/001/009/011  
D036/D113

Etching welded joints in dissimilar ...

TABLE (contd)

Micro- struc- ture	Niobium and titanium	(a) 1 part $\text{HNO}_3$ , (d=1.4), 1 part $\text{H}_2\text{SO}_4$ (d=1.8), 1 part HF <sup>4</sup> (48%) (b) 1 part HF (48%), 1-2 parts $\text{HNO}_3$ (d=1.4), 2-4 parts glycerine or glycol	Chemical	-	-	5-10	17
			Final chemical etching of titan- ium	-	-	5-10	
Macro- struc- ture		2 parts HF (48%), 1 part ammonium fluoride	Chemical	-	-	-	

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S/125/62/000/001/009/011

D036/D113

Etching welded joints in dissimilar ...

TABLE (contd)

Micro-structure	Niobium and tantalum	1 part $H_2SO_4$ (d=1.8), 1 part $HNO_3$ (d=1.4), 1 part HF (48%) or 1 part of a 20% water solution of $NH_4F$ and 1 part HF (48%)	Chemical	-	-	$\leq 30$	
			Chemical	-	-	-	
	Niobium and BJC98 (VZh98) alloy	10 g KCH, 10 g $K_3Fe(CN)_6$ and 20 ml $H_2O$	Electrolytic	5-6	0.2	3-5	

There are 2 figures and 1 table. translation.]

[Abstractor's note: Essentially complete.

Card 6/6



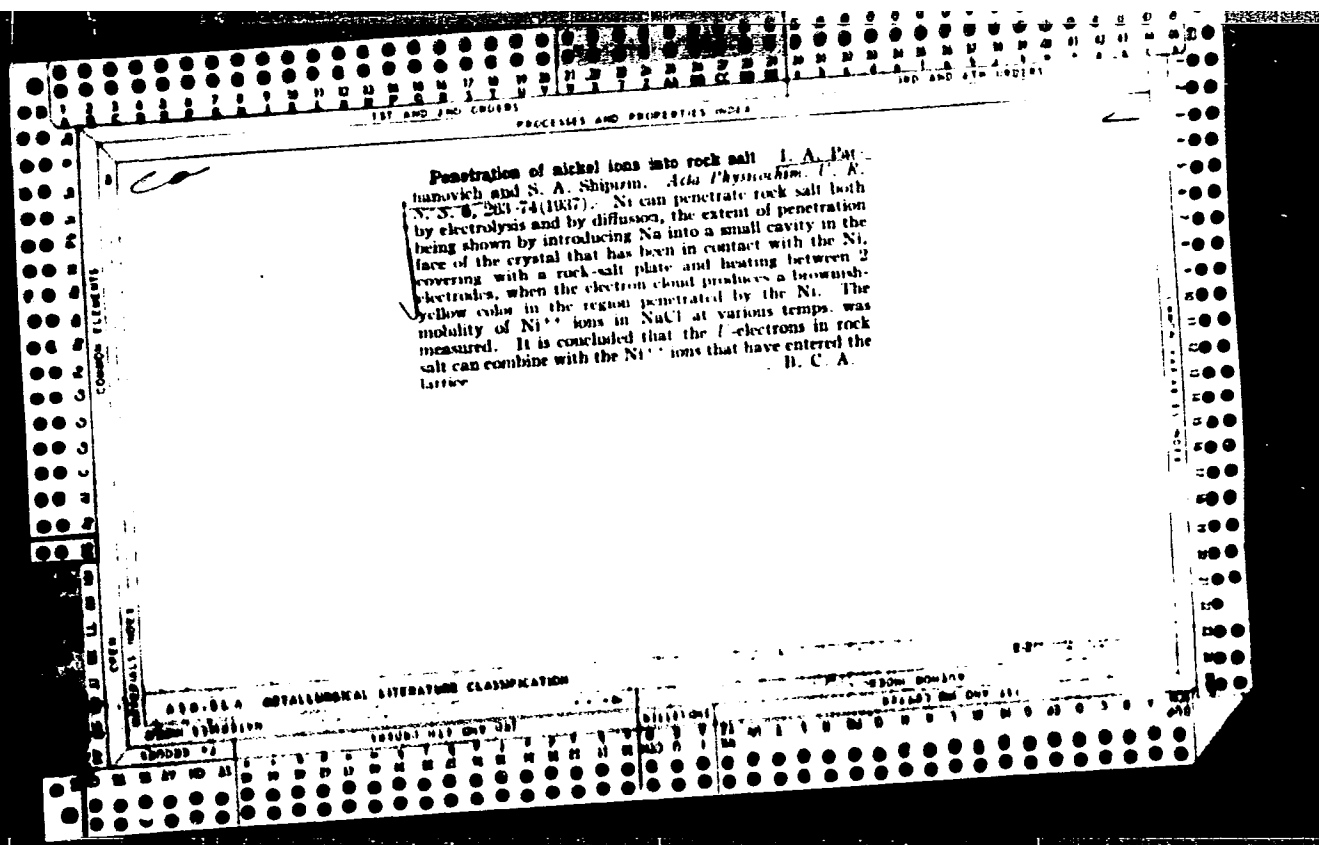
SA

PROCESSING AND PROPERTIES INDEX

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244. Electrolysis of Copper into Rock-Salt. S. Arsenyev and U. Parhamov. *Comptes Rendus de l'Acad. des Sciences, U.S.S.R.* 4, pp. 23-26, Oct. 11, 1934. In German.—The transport of Cu ions in rock-salt was investigated. A crystal of rock-salt,  $2 \times 1.2 \times 0.6$  cm., was clamped between two copper plates. Contact was secured by including a fine copper net between the copper plates and the crystal. The arrangement was heated in an electric furnace to  $645^\circ\text{C}$ . The penetration of the copper into the rock-salt was followed by the coloured bands produced by driving in metallic Na. Preliminary experiments gave the velocity of diffusion of copper into rock-salt as  $15.6 \times 10^{-3}$  mm./sec. at  $645^\circ\text{C}$ . [See Abstract 541 (1935).] F. J. B.

ASS-ILA METALLURGICAL LITERATURE CLASSIFICATION



PARFIANOVICH, N. I.

SA

A 53  
i

3643. Phosphorescence of Rock-Salt Activated by Ni. 1. Parfianovich, J. *J. of Exp. and Theor. Physics, U.S.S.R.* 9, 2, pp. 163-166, 1959. In Russian.—The momentary and prolonged phosphorescence spectra of NaCl + Ni were found to be identical consisting of one band with its maximum at 633 mμ; the absorption spectrum consists also of a single band with maximum at 346 mμ. The law of decay of phosphorescence was studied between 59° C. and 103° C. and was shown to correspond to that for a bimolecular process. The localization energy of an electron in the lattice removed from the centre of phosphorescence was found to be 2.14 eV. D. S.

ASD SLA METALLURGICAL LITERATURE CLASSIFICATION

117 AND 119 (2011)		117 AND 119 (2011)	
TOPICAL AND SUBJECT INDEX			
<p>Penetration of palladium ions into rock salt crystals            I. A. Prokofievich. <i>Zhur. Khim. Teor. Pri.</i> (J. Appl. Theor. Phys.) 18, 780-4 (1948). Crystals of NaCl heated in contact with PdCl<sub>2</sub> 2-4 hrs. at 680-740°, with an elec. field of 20-100 v./cm. applied so as to make the PdCl<sub>2</sub> anode remain transparent to visible light, but a 2nd heating at 650° gives rise to a brown color on the side facing the cathode. Subsequent exposure to electrons deepens the color and gives rise to appearance of a Tyndall cone, indicating formation of colloidal Pd particles from the Pd<sup>++</sup> ions. By spectroscopic analysis, Pd contents of <math>5 \times 10^{-5}</math> - <math>2 \times 10^{-3}</math> g./g. NaCl can be obtained in this way. At 680, 705, and 720°, the mobility of Pd<sup>++</sup> ions is, on the av., 0.47, 0.88, and <math>0.93 \times 10^{-5}</math> sq. cm./v. sec., i.e., 0.6 times less than that of Ni<sup>++</sup> ions (P. and Shapkin, <i>ibid.</i> 7, 888 (1957)) and following the same law of variation with the temp., <math>\mu = \mu_0 e^{-E/RT}</math>. No Pd<sup>++</sup> ions can be introduced into NaCl by plain diffusion at 700-80°, 3-4 hrs. NaCl with Pd<sup>++</sup> ions shows strong absorption in the short-wave ultraviolet, probably owing to a small amt. of colloidal Pd, and some absorption around 380 mμ. The absorption is accompanied by short-lived luminescence with a max. at about 540 mμ. The deeply colored crystals show a strong absorption max. at 380 mμ, and a low max. at about 780 mμ. Coloration of NaCl with Pd<sup>++</sup> ions can be brought about also by 10-min. exposure to ultraviolet; such crystals have a weaker absorption than those colored by exposure to electrons, with max. at about 380 and at 780 mμ. The ultraviolet absorption is attributed to very finely divided colloidal Pd.            N. Tene</p>		2	
		COMMON SUBJECTS INDEX	
<p>ASB-51.2 METALLURGICAL LITERATURE CLASSIFICATION</p>			
<p>SEVEN SYMBOLS</p>		<p>SEVEN SYMBOLS</p>	
<p>SEVEN SYMBOLS</p>		<p>SEVEN SYMBOLS</p>	

PARFIANOVICH, I. A.

USSR/Physics  
Phosphors  
Luminescence

Jan/Feb 49

"The Luminescence of NaCl-Ni Phosphors, Excited  
by X-Rays," I. A. Parfianovich, Irkutsk State U  
niversity A. A. Zhdanov, 6 pp

"Iz Ak Nauk SSSR, Ser Fiz" Vol XIII, No 1

Studied temperature luminescence, radiation under  
action of light from region of absorption of an  
excited phosphor, and spectral component of radia-  
tion. Carried out comparative measurements of the  
concentrations of F-centers in Ni-activated NaCl  
crystals and in nonactivated crystals.

36/49786

PA 51/49T65

PARFIANOVICH, I. A.

USSR/Physics  
Luminescence  
Phosphors  
Jul 49

Luminescence of NaCl-Ni, NaCl-Cu, and NaCl-Ag  
phosphors excited by X-Rays, I. A. Parfianovich,  
Izvest Akad Nauk, 10 pp

"Zhur Eksp 1 Teoret Fiz" Vol XIX, No 7

Establishes that luminescence spectrum of NaCl-Ni,  
NaCl-Cu, and NaCl-Ag phosphors consists of one  
clear band characteristic of the given activator.  
Determines number of systems of local binding  
levels and calculates their depth according to  
51/49T65

USSR/Physics (Contd) Jul 49

number and position of maxima on curves of  
temperature luminescence of phosphors excited at  
room temperature and at 150° K. Establishes that  
distribution of electrons in excited phosphors for  
different systems of local levels depends on  
activator and temperature of phosphor during exci-  
tation. Studies properties of most stable centers  
storing energy for phosphorescence in NaCl-Ni and  
speculates as to their nature. Submitted  
26 Feb 49.

51/49T65

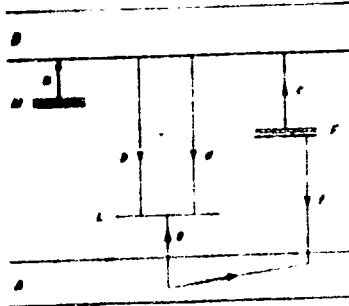
CA

**Mechanism of the flash of sodium chloride-nickel and sodium chloride-copper phosphors excited with x-rays.**  
**A. P. Kuznetsov (Irkutsk State Univ.). Zhur. Eksp. Fiz. 21, 314-21 (1981).—Single crystals of natural NaCl, activated with Ni or Cu by electrolysis at 700-200°C. were excited at room temp. with x-rays under 85 kv., 6 mm. Owing to the considerable depth of the flash levels below the phosphorescence levels, the light stored by electrons at the former levels remains practically unchanged in 400 hrs. at room temp., whereas the phosphorescence light stored falls to 5% of its initial value in 40 hrs. Conservative flash can be produced in NaCl-Ni by absorption of light in the F-band. Upon interruption of the light, phosphorescence appears on heating to 70°. Optically induced flash and thermal phosphorescence could then be alternated 3 times. This secondary phosphorescence indicates that electrons freed from the flash levels by absorption of light in the F-band at room temp. are partially fixed at the phosphorescence levels, but will not stay there at 70°. Measurement of the rate of decay of the intensity  $I$  of the flash at 70° showed a linear decrease of  $\log I$  with time  $t$ ; i.e. exponent of the decay of the intensity is  $\log I$ . Measurement of the recombination character of the emission which follows from the polar nature of the flash level, and which is tantamount to complete separation of the electron from its ion. The kinetics of the decay of a flash not complicated by phosphorescence (which is true at 70°) are described by  $dn/dt = -en$ , where  $n$  = concn. of ionized centers,  $N$  = concn. of electrons in the conduction band, and  $e$  is proportional to**

the cross section for the recombination of electrons and ionized centers; for the concn.  $n$  of electrons at the flash levels, one has  $dn/dt = -En + e_1 N(n - e)$ , where  $E$  = intensity of the flash-inducing light,  $n_0$  = concn. of the flash levels, and  $e_1$  is proportional to the cross section for the capture of the electrons at the flash levels. Since  $n = e + N$ , and  $N \ll n$ , then  $n$  is approx. equal to  $n_0 + (e/e_1) E$ , and  $dn/dt = -En^2/[n_0 + (e/e_1) E]$  and  $(n - n_0) = Ee^{-Et}$ , i.e. an exponential decay. It is not, however, legitimate to infer absence of secondary trapping of electrons at the flash levels; their occurrence follows from the fact that every conservative flash begins at its end, which is greater than that of the preceding flash at its end, which indicates that part of the electrons do pass from the phosphorescence onto the flash levels. Decay of the intensity of the thermally induced phosphorescence with the length of the x-ray excitation varied from 2 to 200 sec. showed that the ratio of the amts. of light stored at the flash and at the phosphorescence levels is const., av. 4.52; consequently, the excitation fills equally both groups of levels. X-rayed non-activated NaCl, and unexposed NaCl-Ni and NaCl-Cu, have the same absorption max. at 465 mμ; this proves that in all 3 crystals the color is due to the same F-centers. In contrast to the 2 temp. max. of the thermally induced phosphorescence of NaCl-Ni, there is only 1 max. at 370°K. in NaCl-Cu, and its color disappears at that temp. When a flash has been induced in NaCl-Cu through absorption of light in the F-band, its spectral comp. is identical with that of the phosphorescence; at the same time, the crystal is decolorized. This proves that, in NaCl-Cu as in NaCl-Ni,

over

$F$ -centers are the flash centers; the light emitted in the thermally induced flash is several times as great as the light emitted in thermally induced phosphorescence. Comparison of the rates of loss of the light stored at the flash and at the phosphorescence levels on standing at room temp. proves that the corresponding centers in NaCl-Cu are of different depths; at the shallow phosphorescence centers, less than 1% of the original electrons remain after 20 hrs., in contrast to the much greater stability of electrons at the deeper flash centers. However, whereas in NaCl-Ni the  $F$ -electrons are lifted by thermal motion from the flash levels to the conduction band and thence recombine with ionized centers, in NaCl-Cu the decomposition of the  $F$ -centers occurs 100° lower and is not accompanied by luminescence. The transitions in this case are illustrated by the scheme where



$A$  = filled band of NaCl,  $B$  = conduction band,  $L$  = activator levels,  $M$  and  $F$  = trapping level system. On excitation, part of the electrons from  $L$  are trapped at  $M$  and part at  $F$ . Heating up to 370°K. results in transitions  $a$  followed by  $b$ . If  $L$  is very close to  $A$ , transitions  $c$  will occur even at room temp., and only radiationless recombinations  $f$  will result between  $F$ -electrons and mobile positive charges in  $A$ . However, on absorption of light in the  $F$ -band, transitions  $c$ , followed by  $d$ , will occur and produce a flash. In the case of NaCl-Cu, thermally induced phosphorescence results in total extinction of the flash, as all electrons from  $F$  complete radiationless transitions to  $A$ . The difference in the thermal stabilities of the  $F$ -levels in NaCl-Ni and NaCl-Cu is determined not by the difference of their depths, but by the different mechanisms of breaking up of these centers. In NaCl-Ni, the distance of  $L$  from  $A$  is greater than the depth of  $F$  from the bottom of  $B$ , and consequently electrons, on gradual heating, can be lifted

from the flash levels into  $B$ ; these transitions will take place at a lower temp. than  $c$ . In NaCl-Cu,  $L$  is closer (about 0.7 e.v.) to  $A$ , whereas the depth of  $F$  is the same as in NaCl-Ni. Consequently, transitions  $c$  occur before the temp. necessary for  $e$  is reached. N. Thon



Dec 51

SR/Physics - Luminescence

Luminescence of KCl-M and KCl-Cu Phosphors Excited by X-rays," I. A. Parfianovich, Irkutsk State U

Zhur Eksp 1 Teoret Fiz" Vol XXI, No 12, pp 1389-1395

Describes results of luminescence studies of phosphors KCl-M and KCl-Cu. Establishes systems of local levels on which electrons, supplying radiative energy, stabilize. Establishes presence of flash levels. Detects both phosphors and F-levels as flash levels.

1981104

Dec 51

USSR/Physics - Luminescence  
(Contd)

thermal extinction of luminescence and analyzes its mechanism. Author thanks Ye. I. Shuraleva, O. N. Shemetova and V. G. Stepanenko for expil help. Submitted 12 Jan 51.

1981104

PARFIANOVICH, I. A.

PARFIANOVICH, I.A.; SHURALEVA, Ye.I.; KRONGAUZ, V.G.

Stimulated photoluminescence of pure NaCl crystals. Izv. vys. ucheb.  
zav.: fiz. no.6:90-94 '63. (MIRA 17:2)

1. Irkutskiy gosudarstvennyy universitet imeni Zhdanova.

PARFIANDVICH, I. A.

7. Mechanism of luminescence of potassium chloride-thallium-activated phosphor excited by x-rays. I. A. Parfiandvich (State Univ., Irkutsk). Zhur. Fiz. Khim. 1979, 55, 117-20 (1953); cf. C.A. 46, 9992a. English transl. in: J. Chem. Phys. 1979, 70, 117-20 (1979).  
 The curve of the intensity of luminescence of KCl (I) excited by x-rays (60 kv, 5 ma.) at 283°K. had 3 peaks:  $T_{max} = 313^{\circ}\text{K}$ ,  $T_{max} = 345^{\circ}\text{K}$ , and  $T_{max} = 460^{\circ}\text{K}$ . A similar curve obtained at 303°K. had a decrease in the intensity of the 1st peak, and a shift towards higher temps. in the 2nd peak. At this temp. the localization of the luminescence centers and the localization of electrons corresponded to 0.67, 0.78, and 0.97 e.v. The fluorescence at the 0.67-e.v. level lasted only a few min. at room temp.; electrons from 0.78-e.v. level also partook in the fluorescence which lasted approx. 4 days. Because the activator system of I overlaps other configurations, the fluorescence from F-level took place only at elevated temp. P. concludes that the luminescence of I is recombinational in nature and is typical for other alkali haloid phosphors. 11 references.

es  
 qn

ACCESSION NR: APL025090

S/0139/63/000/006/0090/0094

AUTHORS: Parfianovich, I. A.; Shuraleva, Ye. I.; Krongauz, V. G.

TITLE: On photostimulated luminescence in pure NaCl crystals

SOURCE: IVUZ. Fizika, no. 6, 1963, 90-94

TOPIC TAGS: optical flash, M-band absorption, x-ray tube, energy transmission phase, F-center, photostimulated luminescence

ABSTRACT: The optical flash from stimulated F- and M-band absorptions in pure natural NaCl crystals has been investigated. The specimens included one untreated NaCl, two heat-treated crystals at 300 and 760C, and another grown from a melt. Excitation was supplied from an x-ray tube BSV-2Cu (50 kv, 10ma) through a 0.1-mm thick aluminum filter at room temperature. It was found that the mechanism involved in the process of flashing is not only the general type but also involves a complex process, including the excitation energy transmission phase from F-centers to other electron centers. It is concluded that the presence of two photostimulated luminescence mechanisms is connected with nonuniform distribution in recombination centers and capture centers in the crystal volume. Orig. art. has:

Card 1/2

ACCESSION NR: AP4025090

4 figures.

ASSOCIATION: Irkutskiy gosuniversitet imeni A. A. Zhdanova (Irkutsk State University)

SUBMITTED: 18Jul62

DATE ACQ: 14Feb64

ENCL: 00

SUB CODE: RH

NO REF SOV: 002

OTHER: 003

Card 2/2

PARFIANOVICH, I. A.

USSR.

1230

THE LUMINESCENCE OF KBr-Ni AND KBr-Cs PHOSPHORS EXCITED BY X-RAYS. I. A. Parfianovich. *Zhur. Eksptl. i Teoret. Fiz.* 25, No. 5, 614-20(1953). (In Russian)

An extension to KBr-Ni and KBr-Cs of previous experiments is reported using the same experimental arrangement. Peaks in the curves of luminescence against temperature from 180 to 400°K reveal the participation of different levels of electronic excitation. Their relative heights depend on the temperature at which the irradiation had taken place. Irradiation by infrared light prior to taking the luminescence-temperature curves enriches the lower levels. A study of the dependence of the intensity of luminescence of KBr-Ni at room temperature on the time after the cessation of the irradiation of the excited phosphors by infrared light shows a sharp drop to a minimum (at 100 sec), then a slow rise to a maximum (at 500 sec), followed by an exponential decay (out to 4000 sec). The rise can be understood in terms of a mechanism of recombination involving a rise in the number of ionized centers of luminescence. Its kinetics are studied in a simple mathematical form. (Science Abstr.)

PARFIANOVICH, I. A.

USSR/Nuclear Physics - Crystal phosphors

FD-717

Card 1/1 : Pub 146-5/18

Author : Parfianovich, I. A.

Title : ~~Determination of the energy level of electron capture in crystal phosphors~~  
Determination of the energy level of electron capture in crystal phosphors

Periodical : Zhur. eksp. teor. fiz., 26, 696-703, Jun 1954

Abstract : Methods are analyzed for determining the energy E of thermal activation of centers providing the illuminating energy in crystal phosphors on the basis of the use of curves of thermal glowing of phosphors. Formulas are derived that facilitate the determination of E from maxima of curves of temperature glowing. 12 references, including 4 foreign.

Institution : Irkutsk State University

Submitted : October 14, 1953

68877

S/139/59/000/05/022/026

E201/E191

24.7700

AUTHORS: Parfianovich, I.A., and Shuraleva, Ye.I.

TITLE: On the Activator Capture Centres and the Activator Luminescence Centres in Alkali-Halide Phosphors

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika,  
1959, Nr 5, pp 139-147 (USSR)

ABSTRACT: The authors studied the interaction of electrons and holes with the activator by recording the additional absorption spectra produced by irradiation of alkali-halide phosphors with X-rays. The phosphors were NaCl-Ni and NaCl-Cu, prepared by electrothermal diffusion from rocksalt crystals. The phosphors were irradiated with X-rays from a tungsten-anode tube at room temperature (50 kV, 18 mA). The optical absorption spectra were measured at room temperature with an SF-4 spectrophotometer (Figs 1-9). These spectra showed that some of the activator ions enter the lattice, replacing its cations, while others are distributed at the crystal defects. Some of the ions which enter the lattice are located in the neighbourhood of ion vacancies, forming with the latter various types of electron-capture centres.

Card  
1/3



<sup>68877</sup>  
S/139/59/000/05/022/026  
E201/E191

On the Activator Capture Centres and the Activator Luminescence  
Centres in Alkali-Halide Phosphors

The simplest type of such centre is an activator ion next to an anion vacancy. Together with a captured electron this system is known as an atomic centre. The atomic centres of nickel and copper are responsible for the 276 and 290 mμ bands in NaCl-Ni and NaCl-Cu respectively. The activator ions located at the crystal defects form local occlusions and their effect appears only at high activator concentrations. Analysis of the additional absorption bands of NaCl-Cu with large amounts of copper suggested that the 215 mμ band is due to centres consisting of such activator occlusions and of captured electrons. In addition to the electron bands discussed above there are also hole bands due to the acceptor levels of the activator. Since the activator ions themselves cannot act as activators the hole capture levels are produced on interaction of the activator with cation vacancies. The hole bands at 330-340 mμ are in fact produced by centres consisting of activator ions,

Card  
2/3

68877

S/139/59/000/05/022/026

E201/E191

On the Activator Capture Centres and the Activator Luminescence  
Centres in Alkali-Halide Phosphors

cation vacancies and holes. The interactions of  
electrons and holes with the activator are used to  
discuss the mechanism of recombination luminescence of  
the two phosphors. ✓

Card  
3/3

There are 9 figures and 29 references, of which 20 are  
Soviet, 7 English, 1 Dutch and 1 translation from  
English into Russian.

ASSOCIATION: Irkutskiy gosuniversitet imeni A.A. Zhdanova  
(Irkutsk State University imeni A.A. Zhdanov)

SUBMITTED: February 9, 1959

L 32816-65 EWT(l)/EWT(m)/EWP(b)/EWP(t) Pad IJP(c) JD/HW

ACCESSION NR: AP5004518

S/0048/65/029/001/0043/0045

AUTHOR: Parfianovich, I.A.; Krongauz, V.G.; Shuraleva, Ye.I.

TITLE: Röntgenluminescence and optical flash in a NaCl:Ni phosphor [Report, 12th Conference on Luminescence held in L'vov 30 Jan-5 Feb 1964]

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v.20, no.1, 1965, 43-45

TOPIC TAGS: luminescence, sodium chloride, nickel, x-ray irradiation, photoluminescence

ABSTRACT: Roentgenluminescence and optical flash stimulated by radiation in the F absorption band was investigated in a NaCl:Ni phosphor. The NaCl:Ni phosphor was chosen for study because its recombination luminescence mechanism is believed to be understood. The intensity of the F-stimulated flash in a phosphor that had been irradiated with x rays at  $-160^{\circ}\text{C}$  increased in a stepwise manner with temperature to a maximum at  $00^{\circ}\text{C}$  and decreased smoothly to zero with further increase of temperature. To explain this behavior it is hypothesized that the charge on the  $\text{Ni}^{2+}$

ions, to which recombination luminescence in this phosphor is due, is reduced by

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L 32816-65

ACCESSION NR: AP5004518

x-irradiation and that the activator ions recover their double charge when the material is heated. This hypothesis is supported by further experiments in which a striking parallelism was disclosed between the variations of optical flash and roentgenoluminescence intensities under the influence of both thermal and optical

ASSOCIATION: IRKUTSKIY gosudarstvennyy universitet (IRKUTSK State University)			
SUBMITTED: 00/--	an65	ENCL: 00	SUB CODE: SS,OP
MR REL: SOV: 004		OTHER: 000	
Card 2/2			

ence in luminescence held in L'vov 30 Jan-5 Feb 1964

SOURCE: AN SSSR, Izvestiya, Seriya fizicheskaya, v.29, no.1, 1965, 59-62

TOPIC TAGS: luminescence, tenebrescence, ionic crystal, alkali halide, impurity content

ABSTRACT: The luminescence of "pure" NaCl and KCl crystals of different origin was examined in order to obtain a basis for judging whether pure crystals can be luminescent. All the crystals exhibited photoluminescence when excited by 200 to 300 mμ radiation. The luminescence was weakest, however, in those crystals in the growth of which the greatest care had been taken to eliminate impurities, and the excitation spectra of the different crystals differed considerably. Emission characteristic of copper activated materials was observed in most of the crystals, and the presence of copper (and some other impurities) was spectroscopically demonstrated in all of them, including natural crystals. Glow curves follow-

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L 32819-65

ACCESSION NR: AP5004522

ing x-ray excitation were recorded. These differed considerably from each other as regards both the position and relative intensity of the peaks, and the light sum stored after identical excitation differed from crystal to crystal. These results have convinced the authors that luminescence and tenebrescence in "pure" alkali halide crystals must be ascribed to the presence of residual impurities. The possibility that so-called  $\alpha$ -luminescence may occur in pure materials, however, is not excluded. Orig. art. has: 2 figures.

ASSOCIATION: Irkutskiy gosudarstvennyy universitet (Irkutsk State University)

SUBMITTED: 00/--Jan65

ENCL: 00

SUB CODE: SS,OP

NR REF SOV: 009

OTHER: 02

Card 2/2

L 39416-65 EWP(1)/EWT(m)/T/EWP(t)/EEC(b)-2/EWP(b)/EWA(c) Pi-4 IJP(c)  
 ACCESSION NR: AP5006058 JD/JG/GG S/0139/65/000/001/0094/0098  
 AUTHOR: Parfianovich, I. A.; Penzina, E. E.; Penzin, Yu. G.  
 TITLE: Photoluminescence of ionic and induced glow centers of single-crystal KBr-Ag  
 SOURCE: IVUZ. Fizika, no. 1, 1965, 94-98

TOPIC TAGS: photoluminescence, ionic center, induced center, glow center, single crystal, x irradiation

ABSTRACT: The article presents some new data on the glow of ionic and atomic silver centers in KBr-Ag phosphors. The new data include spectral characteristics of the ionic centers and of the so-called "induced" glow centers, produced in the crystal when it is exposed to x-rays. The single crystals were grown from the melt by the Kirpoulos method (the AgBr content in the melt was 1 mol.%). The spectral characteristics were investigated with a monochromator. A deuterium lamp was used as the exciting source. The x-rays were produced with a copper tube.



L 39416-65

ACCESSION NR: AP5006058

an analysis of the spectra offers evidence in favor of the recombination mechanism of the afterglow produced upon excitation in the B absorption band. In addition to the blue glow of the B centers, the phosphor exposed to x-rays exhibits glow in the orange-red region of the spectrum with maximum near 600 nm, which increases upon heating. This glow was found to be due to two types of centers excited in the C and D absorption bands. Orig. art. has: 3 figures.

ASSOCIATION: Irkutskiy gosuniversitet imeni A. A. Zhdanova (Irkutsk State University)

SUBMITTED: 26Jun63

ENCL: 00

SUB CODE: OP, SS

NR REF SOV: 007

OTHER: 006

Card 2/2

L 09886-67 EWT(1) IJL(c)  
ACC NR: AP6032545 SOURCE CODE: UR/0139/66/000/004/0007/0011

AUTHOR: Parfianovich, I. A.; Krongauz, V. G.

ORG: Irkutsk State University imeni A. A. Zhdanov (Irkutskiy gosuniversitet)

TITLE: Recombination luminescence KI—TI phosphor

SOURCE: IVUZ. Fizika, no. 4, 1966, 7-11

TOPIC TAGS: luminescence, recombination, recombination process, recombination luminescence, phosphor, phosphor luminescence, optical flash, x ray luminescence, flash brightness, electron hole, energy migration

ABSTRACT: A study was made of the x-ray luminescence and optical flash of several samples of KI—TI containing different amounts of an activator, excited by x-rays at  $T = 105\text{K}$ . Pulse measurement of the temperature dependence between the brightness of the flash and x-ray luminescence were found to be complex, and a series of alternating increases and decreases in these values was observed between the temperatures  $105\text{—}240\text{K}$ . At the same time a pronounced parallelism was observed in variations in brightness and x-ray luminescence within this temperature range. The increase in flare brightness and in x-ray luminescence

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L 09886-67

ACC NR: AP6032545

following the heating of excited samples from 105 to 133K is discussed. The regularities observed are explained, taking into account the redistribution of hole centers. The data obtained point to the importance of the electron-hole mechanism in the migration of energy from the basic substance to the centers of luminescence in KI—Tl phosphors. Orig. art. has: 3 figures. [Authors' abstract]

SUB CODE: 20/ SUBM DATE: 24Nov64/ ORIG REF: 005/ OTH REF: 001/

212 <sup>5/12</sup>

ACC NR: AP7004957

SOURCE CODE: UR/0048/66/030/009/1414/1415

AUTHOR: Parfimonovich, I.A.; Krongauz, V.G.

ORG: Irkutsk State University (Irkutskiy gosudarstvennyy universitet)

TITLE: Effect of build-up of the F-flash and roentgenoluminescence in KI:Tl phosphors  
/Report, Fourteenth All-Union Conference on Luminescence (Crystal Phosphors) held at  
Riga, 16-23 Sept. 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 9, 1966, 1414-1415

TOPIC TAGS: luminescence, alkali halide, potassium compound, iodide, thallium, x ray  
irradiation, luminescence center

ABSTRACT: The authors investigated the roentgenoluminescence and the F-flash in thallium-activated KI crystals. The specimens were irradiated with x-rays for 15 minutes at 105° K and the intensity of the F-flash was recorded both before and after the specimen had been heated to 133° K and again cooled to 105°. The specimen was again irradiated with x-rays and the whole cycle was repeated several times. Heating the specimen to 133° and subsequently cooling it to 105° was found to increase the intensity of the F-flash as well as the initial intensity of the luminescence during the subsequent x-irradiation. When the specimen was irradiated with F-band light instead of x-rays, heating to 133° and subsequent cooling did not enhance either the F-flash of the x-ray flash. The observed effects of heating are ascribed to dis-

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ACC NR: AP7034957

sociation at 133° K of  $V_K$  centers and the entrapment of the holes thereby released in the vicinity of  $Tl^+$  ions with the formation of  $Tl^+p$  centers. Orig. art. has: 2 figures.

SUB CODE: 20 SUBM DATE: none ORIG. REF: 005 OTH REF: 001

Card 2/2

ACC NR: AP7004958

SOURCE CODE: UR/0048/66/030/009/1416/1419

AUTHOR: Parfianovich, I.A.; Ivakhnenko, P.S.; Shuraleva, Ye.I.

ORG: Irkutsk State University (Irkutskiy gosudarstvennyy universitet)

TITLE: Investigation of the roentgenoluminescence, absorption and emission spectra of NaCl:Eu single crystals /Report, Fourteenth All-Union Conference on Luminescence (Crystal Phosphors) held at Riga, 16-23 Sept. 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 9, 1966, 1416-1419

TOPIC TAGS: luminescence, sodium chloride, europium, luminescent crystal, luminescence spectrum, absorption spectrum, x ray irradiation, luminescence center, temperature dependence

ABSTRACT: The authors investigated the luminescence and absorption of NaCl:Eu crystals grown from a melt in order to obtain information concerning the nature and conversion of the luminescence centers. The absorption spectrum of crystals that had been heated to 350° C had peaks at 240, 340, and 370 mμ. Illumination in these bands excited luminescence peaking at 425 mμ. All three of these absorption bands are ascribed to the same type I centers. In annealed crystals there were found centers of a second type (type II), characterized by absorption peaks at 260, 272, and 330 mμ and a broad luminescence spectrum peaking at 455 mμ, which was strongly stimulated by illumination in the 272 mμ band but not by illumination in the 260 mμ band. When the

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ACC NR: AP7004958

specimens were irradiated with x-rays there was first a build-up of the luminescence, then a decline. The decline is ascribed to transformation of the luminescence centers by the x-rays. Induced absorption peaks were found at 272, 312, 410, and 570 mμ. The 272 and 312 mμ induced absorption bands did not appear in annealed crystals and no emission was observed from the induced activator centers in any of the specimens. The roentgenoluminescence intensity exhibited a complex temperature dependence, first decreasing as the temperature was raised above room temperature and then increasing and passing through two maxima at about 150 and 320° C. The 150° maximum was found to be due to increase of the build-up light sum. From the temperature dependence of the absorption spectra it is concluded that the presence of the 320° C maximum is due to conversion of type I centers to type II centers at temperatures between 160 and 260° and their subsequent re-establishment at higher temperatures. Orig. art. has: 8 figures.

SUB CODE: 20

SUBM DATE: none

ORIG. REF: 005

Card 2/2

1st and 2nd Index										Processes and Properties Index										3rd and 4th Index									
<p><b>PARFIANOVICH, I. A.</b></p> <p><i>CA</i></p> <p><i>3</i></p> <p>The radioactivity of the springs and minerals of the Soudzhenka district. S. A. ARZHENOV AND I. A. PARFIANOVICH. <i>Compt. rend. acad. sci. U. R. S. S., Ser. A</i>, 1928, 125 7; (Chem. Zvest. 1930, 1, 810).—The springs examined had a radioactivity corresponding to 0.3-1.12 miche units. Of the strongly active minerals only orthites were found. They contained 0.97 to 4.05% Th. The Ra content varied between <math>1.1 \times 10^{-11}</math> and <math>6.9 \times 10^{-11}</math> g., and the U content was from <math>0.6 \times 10^{-4}</math> to <math>1.9 \times 10^{-4}</math> g. per g. of orthite.</p> <p>G. SCHWIMM</p>																													
<p>ASB-55A METALLURGICAL LITERATURE CLASSIFICATION</p>																													



L 42899-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6018446

SOURCE CODE: UR/0051/66/020/006/1058/1062

AUTHOR: Parfianovich, I. A.; Krongauz, V. G.

ORG: none

TITLE: X-ray luminescence and optical flash on KJ-Tl phosphor

SOURCE: Optika i spektroskopiya, v. 20, no. 6, 1966, 1058-1062

TOPIC TAGS: phosphor, luminescence, recombination luminescence, x ray effect, electron hole, potassium compound, thallium compound, thermal activation, optic brightness / KJ-Tl phosphor

ABSTRACT: The authors investigated the dependence of x-ray and light-generated luminescence and optical flashes in KJ-Tl phosphor on changes in ambient temperature. The experimental data provide satisfactory evidence of the important role played by the position of the localized holes with respect to the thallium centers. In addition, the data confirm the electron hole mechanism of energy transport to the luminescence centers although they do not preclude the possibility of an exciton phase as the means of transfer, especially in the final stages of the investigated process. The experiments consisted of exposing specimens of KJ-Tl phosphor to x-rays and then observing the intensity of the optical flash after the termination of the excitation. The intensity of luminescence during the x-ray exposure was also recorded. The samples were

UDC: 537.531 : 535.37

Cord 1/2

L 42899-66

ACC NR: AP6018446

exposed to x-rays for 15 minutes at a temperature of 105°K. After an initial rise, the intensity was observed to level off. A spontaneous optical flash followed a short time after the termination of excitation. The temperature of the specimen was then increased to 133°K. The intensity of luminescence was considerably higher during the subsequent irradiation, though it fell off rapidly to the level prior to the temperature rise. The intensity of the optical flash following the second x-ray exposure was somewhat higher. The temperature of the sample was increased to 133°K again. An x-ray pulse generated a luminescence pulse of an intensity comparable to that at the onset of the second excitation cycle. Finally, during the third cycle, the intensity of luminescence due to exposure to light in the F-band, decreased very rapidly from an initially high value to zero. Orig. art. has: 3 figures.

SUB CODE: 11/      SUBM DATE: 21Dec64/      ORIG REF: 005/      OTH REF: 001

20/

Card 2/2

ldh

1 28 26-66 EWT(m)/EWP(t)/ETI IJP(c) JD

ACC NR: AP6013091

SOURCE CODE: UR/0045/66/030/004/0719/0721

AUTHOR: Parfianovich, I.A.; Pologrudov, V.V.; Karnaukhov, Ye.N.

ORG: Irkutsk State University (Irkutskiy gosudarstvennyy universitet)

TITLE: Effect of an electric field on the roentgenoluminescence of NaCl:Cu phosphor  
/Report, Fourteenth Conference on Luminescence held in Riga 18-23 September 1965/

SOURCE: AN SSSR. Izvestiya. Seriya fizicheskaya, v. 30, no. 4, 1966, 719-721

TOPIC TAGS: luminescence, electric effect, sodium chloride, crystal phosphor, roentgenoluminescence, electric field, x ray irradiation

ABSTRACT: It is known that an electric field can affect the recombination luminescence of alkali halide phosphors; the electric field may either enhance or quench the luminescence, depending on the composition of the phosphor and the experimental conditions. In some cases, however, both of these effects may occur simultaneously. Such a dual effect, in particular, was observed by the authors in investigating the influence of an electric field on the luminescence of type I centers in NaCl:Cu. The specimens all were grown from a melt (1 mole % copper in the melt) and activated to different degrees by thermal diffusion. The specimens were prepared in the form of single crystal plates (0.18 mm thick) and were mounted between two electrodes: one the furnace rod with a platinum cap and the other a metal grid. The phosphor was excited through

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the grid electrode by x rays from a BSV2-Fe tube operated at 20 kV and 15 mA. At the same time there was applied to the crystal specimen a 50 cycle alternating field having a strength of about  $10^5$  V/cm. The luminescence was isolated by a UFS-1 ultra-violet filter and recorded by an FEU-18A photomultiplier coupled to a mirror galvanometer. The character of the effect of the electric field differs at different sections of the roentgenoluminescence time curve. Thus, for example, for the phosphor with 1 mole % copper during the first seconds of excitation the electric field quenches the luminescence, but with increase of the x-ray dose the quenching is reduced, and some 15-20 sec after the beginning of excitation the luminescence is enhanced at the instant of application of the field. Thus, the quenching and stimulating effects compete. Temperature studies showed that with increase of the temperature the quenching process increasingly dominates and beginning with about 75°C is the only effective one. The following inferences are drawn on the basis of the experimental results regarding the processes that may occur in the crystal incident to application of an electric field. The mechanism responsible for enhancement of the luminescence is release of electrons from shallow traps. With increase of the activator concentration the number of defects relative to the number of luminescence centers is reduced so that the stimulation by the electric field is diminished. Holes are released from the activator trapping levels and drop into the valence band. Migration of weakly bound activator ions also leads to decrease of the luminescence intensity. That such migration occurs follows from the high mobility of copper ions and the existence of a memory effect. Orig. art. has: 2 figures and 1 table.

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